



EXTENSIVE REVIEW ON SHUKTA KALPANA- ACIDIC FERMENTATIVE PREPARATIONS

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ABSTRACT

Shukta Kalpana, a distinctive category of fermented medicinal preparations in Ayurveda, encompasses a variety of acidic fermented products such as *Kanji*, *Tushodaka*, *Sauvira*, and others, each offering unique therapeutic properties. These preparations are primarily characterised by their sour, fermented nature and are used in the holistic approach to healing within Ayurvedic practices. The review presents the etymology, classification, properties (*Guna*), actions (*Karma*), indications, contraindications, and methods of preparation of *Shukta Kalpana* as described in classical literature. *Shukta Kalpana* includes a variety of formulations like *Shukta*, *Chukra*, *Tushodaka*, *Sauvira*, *Sandaki*, *Kanji*, *Kalamla* and *Asuta*. Comparative insights are also drawn with modern equivalents such as vinegar, pickled vegetables, and fermented beverages. Emphasis is laid on the pharmacological benefits, including digestive stimulation, probiotic activity, anti-inflammatory, and cardioprotective effects. Notably, *Kanji* emerges as the most referenced and therapeutically versatile preparation. The study concludes that *Shukta Kalpana* exemplifies the advanced understanding of fermentation in ancient Ayurvedic medicine, providing a foundation for further research and contemporary therapeutic applications.

KEYWORDS: Acidic fermentation, *Kanji*, *Sauvira*, *Shukta*, *Shukta Kalpana*, *Tushodaka*

INTRODUCTION

In Ayurveda, pharmaceuticals are categorized under the term *Bhaishajya Kalpana*, which encompasses a wide range of pharmaceutical preparations. It covers both primary formulations, such as *Panchavidha Kashaya Kalpana* (primary preparations), and its *Upkalpana* (secondary preparations). In *Panchavidha Kashaya Kalpana Svarasa* (Juice), *Kalka* (Paste), *Kvatha* (Decoction), *Hima* (Cold infusion), *Phanta* (Hot infusion) are included. In *Upkalpana Churna* (powder), *Sneha* (medicated oils), *Avaleha* (linctus), *Sandhana* (fermentation), etc., are included. Among them, *Sandhana Kalpana* refers to the method of preparing and preserving medicinal formulations through fermentation. The term “*Sandhana*” translates to “preservation” or “fermentation,” and *Kalpana* refers to the process or preparation. In this context, *Sandhana Kalpana* involves the fermentation of herbs, minerals, or other substances to enhance their therapeutic properties and preserve their efficacy. By combining the principles of fermentation with medicinal knowledge, *Sandhana Kalpana* aims to create potent, bioavailable preparations that can aid in balancing the body's doshas and treating various ailments.

Acharya Yadavji Trikamji has classified *Sandhana Kalpana* (fermented formulation) into two parts, i.e. *Madhya* (alcoholic) and *Shukta* (acidic).¹ The *Madhya* group consists of preparations like *Asava*, *Arishta*, *Sura*, *Varuni*, and *Sidhu*.² On the other hand, *Shukta* encompasses preparations that have a more acidic nature. These include formulations such as *Tushodaka*,

Sauvira, *Sandaki*, *Kanji*, *Asuta*, *Kalamla*, etc.³

Shukta Kalpana, a distinctive preparation in Ayurvedic medicine, refers to Acidic fermented preparation that is prepared indirectly or when the alcoholic preparations may turn acidic with the passage of time.⁴ This preparation has its own therapeutic utility as well as nutritional value.

This review aims to explore the various aspects of *Shukta Kalpana*, including its definitions, methods of preparation, therapeutic uses, and associated *Guna-Karma* (qualities and actions) based on Ayurvedic classical texts. By critically analysing the information from these ancient scriptures, this review provides a comprehensive understanding of *Shukta Kalpana* and its role in traditional Ayurvedic practices.

MATERIAL AND METHODS

The information related to *Shukta Kalpana* i.e., etymology, synonyms, method of preparation, properties and therapeutic indication were collected from Ayurvedic literature like *Charaka Samhita*⁵, *Sushruta Samhita*⁶, *Ashtanga Samgraha*⁷, *Ashtanga Hridaya*⁸, *Bhela Samhita*⁹, *Harita Samhita*¹⁰, *Dhanvantari Nighantu*¹¹, *Chakradatta*¹², *Gadanigraha*¹³, *Dravyaguna Samgraha*¹⁴, *Sodhala Nighantu*¹⁵, *Sarangadhara Samhita*¹⁶, *Madhava Dravyaguna*¹⁷, *Madanpala Nighantu*¹⁸, *Kaiyadeva Nighantu*¹⁹, *Bhavaprakasha Samhita*²⁰, *Bhavaprakasha Nighantu*²¹, *Raj Nighantu*²², *Yogaraj Nighantu*²³, *Bhaishajya Ratnavali*²⁴, *Dravyaguna Vigyanika*²⁵, Ayurvedic

Pharmacopoeia of India (API)²⁶ and Ayurvedic Formulary of India (AFI).²⁷ Obtained information has been screened and critically analysed.

RESULTS

Etymology:

The term “*Shukta Kalpana*” is discussed in various classical literature. ‘*Shukta*’ word derived from ‘*Shuch*’ *Dhatu*, which means *Amla* (sour).²⁸ *Shukta* word refers to also fermented, become acidic or sour, astringent and sour, putrid, stinking and sourness.²⁹

Definitions:

Alcoholic preparations may turn acidic with passage of time, then they are called *Shukta*.³⁰ Liquids which are sweet in taste by nature, but due to effect of time and temperature, when become acidic these are called *Shukta*.³¹ When the liquid associated with *Kanda*(rhizomes), *Mula*(Roots), *Phala*(fruits), etc. substances added with *Sneha* and *Lavana* in water, are allowed to fermentation, that liquid is called as *Shukta*.^{32,33,34,35,36}

Synonyms:

The synonyms of *Shukta* are *Sahastravedha*, *Rasamla*, *Chukra*, *Muktasara*, *Dahana*, *Neelakaraka*, *Chanda*, *Bhedana* and *Amla*.³⁷

Classification:

Shukta Kalpana is included in various *Adhyaya/Varga/Gana*

Types of Shukta Kalpana:

Different texts mentioned the variety of preparations under *Shukta Kalpana*, which are mentioned in Table No. 2.

Sr. No.	Name of Kalpana	Ch. S	Su. S	A. H & A. S	C. D	H. S	Sh. S & Y. R	B. R	D. G. V	D. G. S	D. N	So. N	M. D. G	M. D. P & R. N.	K. N	B. P. N	API	AFI
1	<i>Shukta</i>	-	√	√	-	-	√	√	√	√	√	√	√	-	√	√	-	-
2	<i>Chukra</i>	-	-	-	√	-	√	-	√	-	√	-	-	√	√	-	-	-
3	<i>Tusodaka</i>	√	√	√	-	√	-	-	√	√	√	√	√	√	√	√	-	-
4	<i>Sauviraka</i>	√	√	√	-	-	-	-	-	√	√	√	√	√	√	√	-	-
5	<i>Sandaki</i>	-	-	√	-	-	√	-	√	-	-	√	-	-	√	√	-	-
6	<i>Kanji</i>	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
7	<i>Asuta</i>	-	-	√	-	-	-	-	-	-	-	√	-	-	-	√	-	-
8	<i>Kalamla</i>	-	-	-	-	-	-	-	-	-	-	√	-	-	√	-	-	-

Table No. 2: Types of Shukta Kalpana in different texts

All types are described as follows:

- 1. Shukta:** It defines as general definition of *Shukta*, stated as when the liquid associated with *Kanda*, *Mula*, *Phala*, etc. substances is added with *Sneha* and *Lavana* in water, allowed to ferment, that liquid is called a *Shukta*.³⁸ It has properties like *Laghu* (light), *Ruksha* (dry), *Tikshna* (sharp), *Ushna* (hot), *Katupaki*³⁹ and actions like *Bhedana* (Purgation), *Bhuktavipachana* (Digestive support), *Kaphaghna* (Kapha-reducing), *Rochana* (Appetizer), *Mutrala* (Diuretic), *Hridya* (Cardiac tonic), *Pandu-Krimihara* (Anemia - Worm-destroying), *Raktapittakara* (increase *Rakta* and *Pitta*).⁴⁰ *Kaiyadeva Nighantu*⁴¹ refers types of *Shukta* like

(chapter) by different texts mentioned in Table no 1.

Sr. No.	Name of texts	Varga/Gana/Adhyaya
1	<i>Charaka Samhita</i>	<i>Annapanavidhi</i>
2	<i>Sushruta Samhita</i>	<i>Drava Dravya</i>
3	<i>Ashtanga Sangraha</i>	<i>Drava Dravya</i>
4	<i>Ashtanga Hridaya</i>	<i>Drava Dravya</i>
5	<i>Harita Samhita</i>	<i>Kanjika</i>
6	<i>Dhanvantari Nighantu</i>	<i>Suvarnadi</i>
7	<i>Chakradatta</i>	<i>Grahaniadikara</i>
8	<i>Dravyaguna Sangraha</i>	<i>Madhyadi</i>
9	<i>Shodhala Nighantu</i>	<i>Madhyadi</i>
10	<i>Sharangadhara Samhita</i>	<i>Asavaarishta Kalpana</i>
11	<i>Madhavadravayaguna Nighantu</i>	<i>Kanjika</i>
12	<i>Madanapala Nighantu</i>	<i>Paniyadi</i>
13	<i>Kaiyadeva Nighantu</i>	<i>Drava Dravya</i>
14	<i>Bhavaprakash Nighantu</i>	<i>Sandhana</i>
15	<i>Raj Nighnatu</i>	<i>Kshiradi</i>
16	<i>Bhaishajya Ratnavali</i>	<i>Paribhasha</i>
17	<i>Dravyaguna Vigyanaya</i>	<i>Paribhasha</i>
18	API	<i>Paribhasha</i>
19	AFI	<i>Paribhasha</i>

Table No 1: Shukta Kalpana included in various Adhyaya/Varga/Gana

- 2. Chukra:** When any *Madya* or *Madhura Drava* (alcohol or *GudaShukta*, *MadhuShukta*, *MadhvikaShukta* and *IkshuShukta*, which are prepared by using different materials. When *Gudambu* (Jaggery water) is mixed with *Taila*(oil), *Kanda*(tuber), *Mula*(root), *Phala*(fruit) and kept for fermentation till sourness is produced, it called *GudaShukta*.⁴² When grapes juice is used instead of jaggery water, it is known as *Madhavikashukta*. If sugarcane juice is used instead of jaggery water, it is known as *IkshuShukta*.⁴³ *MadhuShukta* is prepared by the fermentation of *Jambiri Svarasa* (Citrus jambhiri) and *Pippalimula* (Piper longum Linn) placed in a vessel filled with honey by keeping it in *Dhanyarashi* (pile of Grains) till the desired taste appears.⁴⁴

any sweet liquid) become sour, they are called 'Vinasta'. When this *Vinasta* is kept for fermentation, the liquid obtained will be called as '*Chukra*'.⁴⁵ The synonyms of *Chukra* are *Sahastravedha*, *Rasayana*, *Rasamla*, *Chakravedha*, *ShakhAmlaBhedana*, *Amlasara* and *Chukrika*.⁴⁶ *Chukra* has properties like *Tikta* (Bitter), *Amla*, *Svadu Rasa* (Sweet taste), *Kaphapittanashaka* (*Kapha* and *Pitta* reducer) and used in *Nasika Roga* (nasal disease), *Nasikadurgandha* (Foul smell from the nose), *Shiro Roga* (disorders of head).⁴⁷ In *Dhanvantari Nighantu*, the process for preparing *Chukra* involves mixing *Mastu* (curd water) with *Guda* (jaggery), *Madhu* (honey), and *Kanjika* (sour gruel) in a clean vessel, allowing the mixture to ferment for three nights.⁴⁸ According to *Kaiyadeva Nighantu*, the same process is followed, but the ingredients are doubled, with the addition of *Ikshu* (sugarcane).⁴⁹ There are two types of *Chukra* are also mentioned i.e. *Swalpa* and *Bruhada Chukra*.⁵⁰ Which are used in *Vatavikara* (disorders due to *Vata*), *Kaphavikara* (disorders due to *Kapha*), *Amadosha* (vitiated *Ama*), *Arsha* (Hemorrhoids), *Vatagulma* (*Vata*-lump), *Shoola* (abdominal pain) and *Udararoga* (Abdominal diseases).

3. **Tushodaka:** It is prepared by crushed *Yava* (barley grains) with husk allowed to ferment till an acidic taste is produced.⁵¹ The synonyms of "*Tushodaka*" are *YavAmlaja*, *Yavotha*, *Tushotha* and *Tushodaka*.⁵² Properties of *Tushodaka* are *Katu Vipaki*, *Bhedana*, and *Jatharagnideepaka* (increase digestive power).⁵³ It is indicated in *Mandagni* (subdued digestive power), *Hridya Roga* (heart disease), *Pandu*, *Krimiroga*, *Aruchi* and *Vata Roga*.⁵⁴
4. **Sauvira:** It is prepared by fermentation of *Yava* without husk boiled in water.⁵⁵ The synonyms of "*Sauvira*" are *Sauviraka*, *SuvirAmla* and *Yavagodhumasambhava*.⁵⁶ *Sauvira* is used in disease conditions like *Arsha*, *Anaha* (Abdominal distention), *Asthishula* (Pain in bone), *Gulma* (lump), *Kaphaghna*, and *Udavarta* (Reverse peristalsis).⁵⁷ *Sauvira* is also prepared by *Godhuma* (wheat grains).⁵⁸ It has *Amla*, *Katu*, *Kashaya* (Astringent) taste *Kaphavatahara* (*Kapha*-*Vata* reduce), *Sama Pitta Jarayati* (Balanced *Pitta* aggravates the body).⁵⁹
5. **Sandaki:** It is prepared by fermentation of *Mulaka* (*Raphanus sativus* Linn) and *Sarsapa* (*Brassica campestris* Linn.) etc. drugs.⁶⁰ *Acharya Bhavaprakasha* mentioned to prepared by *Mulaka Patra Drava* (Radish leaves juice) with *Sarsapa Svarasa* along with *Rajika* (*Brassica nigra*) and *Shalipishti* (paste of rice).⁶¹ It can also prepared by using root of *Mulaka*, *Kanda* and *Mudga Vataka* (ball of green gram).⁶² It has *Ruchikara* and *Laghu Guna*.⁶³
6. **Kalamla:** *Kalamla* is prepared by the fermentation of *Pinyaka* (paste of sesame) etc.⁶⁴ It is *Atitikshana* (extreme level of intensity), *Ushna*, *Ruksha*, *Amla*, *Deepana* (Appetizer).⁶⁵
7. **Asuta:** It is prepared by the fermentation of *Kanda*, *Mula*, and *Phala* used in major part then liquid.⁶⁶ It is *Pachaka* (Digestive), *Vatahara* and *Laghu* in *Guna*.⁶⁷
8. **Kanji:** *Kanji* has been described as "*Kanjeeviyami*" i.e. 'to whom make alive'.⁶⁸ Synonyms of *Kanji* are *Avantisoma*, *Aranala*, *Abhishuta*, *Kajjalama*, *Kulmasha*, *Gehambu*, *Dhanyajala*, *DhanyAmla* and *Kanjika*.⁶⁹ It is made from

various ingredients with preparation method (Table 3). *Shali* (rice) is the most used ingredient to prepare *Kanji*. Classics also claimed that *Kanji* prepared from '*Dhanya*' have *Pranadharan* (vital energy support), *Agni Vardhaka* (enhance or increase the digestive fire), *Pachaka*, *Bhedana*, *Tikshana*, *Ushnavirya*, *Ruchikara*, *Laghu* properties⁷⁰. When it is made from *Kshudradhanya* (millets), it is also called as *DhanyAmla*. It causes *Pitta*, *Vata*, *Gulma*, *Shlipada* (filariasis) and *Peenasa* (sinusitis).⁷¹ Residue of this fermented product are called '*Kinvaka*' or '*Katvara*'.⁷² When de-husked wheat is used for preparation it called as *Aranala*.⁷³ In *Harita Samhita*, *Acharya* also mentioned various types of *Kanji* with its properties like *YavaKanji*, *GodhumaKanji*, *YugadharanaKanji* and *TilayuktaKanji*.⁷⁴

Sr. No.	Preparation method with ingredients	Reference
1	<i>Dhanyamla</i> was prepared by fermentation of <i>Shali Churna</i> and <i>Kodrava</i> etc. is called as <i>Kanjika</i> .	<i>Acharya Dalhan</i> Commentary on Su. 45/214, Bha. P. Ni. 21/11,
3	<i>Kanji</i> was prepared by fermentation of <i>Dhanyamanda</i> .	Bha. P. Ni. 21/1
4	<i>Dhanyamla</i> was prepared by fermentation of <i>Shali</i> , <i>Joorna</i> (sorghum), and <i>Kodrava</i> .	Kai. Ni. 4/410
5	<i>Kanji</i> was prepared by fermentation of <i>Kulmasha</i> (<i>Kutsita Masha</i> or <i>Ardhasvinna Masha</i>) and <i>Dhanyamanda</i> .	Sh.M.Kh. 10/14, Y.R.1, Pg.no.127
7	<i>Aranala</i> was prepared by fermentation of <i>Nistusha Godhuma</i> and boiled in water.	Bha. P. Ni. 21/9
8	<i>Kanji</i> was prepared by combine one <i>Prastha</i> of <i>Dhanya</i> , one <i>Prastha</i> of tender <i>Mulaka</i> , and one <i>Adhaka</i> of water should be taken in an earthen pot and sealed with clay and cloth. The pot should be kept undisturbed till the liquid attains sourness.	B.R. 4/52-53
9	<i>Shali</i> was taken into the vessel and then five parts of water were added to it & subjected to heat on the gas stove to prepare <i>Bhakta</i> . Then warm water was added in a three-time quantity of that <i>Bhakta</i> and Mixed it well. This preparation is known as <i>Kanji</i> .	D. V. P. K. Ut. <i>Paribhasha Khanda</i> , 86, Pg.no 68, API Part – 2, vol – 2, Pg no. 275, AFI, Part – 1, Pg no. 348
10	<i>Kanji</i> was prepared by fermentation of <i>Shali</i> and <i>Kodrava Manda</i> .	D. V. P. K. Ut. <i>Paribhasha Khanda</i> , 86, Pg.no 68

Table No. 3: Various ingredients and method to prepare Kanji

Acharya mentioned Rasa of *Kanji* is Atyanta *Amla* (extreme level of sour).⁷⁵ Properties of *Kanji* are found in various Ayurvedic texts which are mentioned in table no. 4.

Sr. No.	Properties	Ch. Su.	Su. Su.	A.H.	D. N.	So. N.	M.D.G.N	D.G.S.N	M.P.N.	R. N.	K. N.	B.P. N.
1	<i>Avisrashi</i> (Obstructed elimination)	+	+	-	+	-	+	-	-	-	-	-
2	<i>Bhedi</i>	-	-	+	-	+	-	+	-	-	+	-
3	<i>Guru</i> (heavy)	-	-	-	-	-	-	-	-	-	-	-
4	<i>Laghu</i>	-	+	+	-	+	-	+	+	-	+	+
5	<i>Sparsha Sheetala</i> (cool touch)	-	-	-	-	+	-	+	+	-	+	-
6	<i>Tikshna</i>	-	+	+	-	+	-	+	-	-	+	+
7	<i>Ushna</i>	-	-	+	-	+	-	+	-	-	+	+

Table No.4.: Properties of Kanji are found in various Ayurvedic texts

When *Kanji* used internally, it is *Vatakaphahara* and *Pittakaraka*.⁷⁶ When use externally it is *Dahashamaka* (alleviate burning sensations).⁷⁷ Different *Karma* of *Kanji* are found in different texts as mentioned in table no 5. *Kanji* is indicated in various diseases (table no.6). Contraindications of *Kanji* are also mention like a person who suffers from diseases

conditions like *Shosha* (Emaciation), *Murchha* (Fainting), *Kandu* (pruritis), *Kshaya* (Cachexia), *Bhrama* (giddiness), *Visha* (Poisoning), *Raktapitta*, *Pandu* (Anemia), *Raktavikara* (Blood disorders), *Shotha* (Edema), *Rajyakshma* (consumption), *Kshatakshina* (Debility), *Mandajvara* (Low-grade Fever) and *Shrami* (Fatigue) should not consume *Kanji*.⁷⁸

Sr. No.	Action	Ch. Su.	Su. Su.	A.H.	D. N.	So. N.	M.D.G.N	D.G.S.N	M.P.N.	R. N.	K. N.	B.P. N.
1	<i>Adhmana</i> (distension)	-	-	-	-	-	-	-	-	+	-	-
2	<i>Ajirna</i> (indigestion)	-	-	-	-	-	-	-	-	-	+	+
3	<i>Amavata</i> (rheumatism due to āma)	-	-	-	-	-	-	-	-	-	+	-
4	<i>Bastishulanasaka</i> (alleviate cystodyna)	-	+	+	-	+	-	+	-	-	+	-
5	<i>Murchchahara</i> (alleviate syncope)	-	-	+	-	+	-	+	-	+	-	-
6	<i>Pranadharana</i>	-	-	-	-	-	-	-	-	+	+	-
7	<i>Shrama</i> (fatigue)- <i>Klamahara</i> (fatigue without physical exertion)	-	-	+	-	+	-	+	-	+	+	-
8	<i>Shula</i>	-	-	-	-	-	-	-	-	+	+	+
9	<i>Sprasha - Daha Jvarapaha</i> (application of touch to relieve burning sensations and reduce fever)	+	+	-	+	-	+	-	+	+	-	+
10	<i>Trushnahara</i> (alleviate thrust)	-	+	-	-	-	-	-	-	-	+	-
11	<i>Vatashophaghna</i> (alleviate oedema due to Vata)	-	-	-	-	-	-	-	-	+	-	-
11	<i>Vibandha</i> (constipation)	+	-	-	+	-	+	-	-	+	+	+

Table No. 5: Action of Kanji mentioned in various Ayurvedic texts

DISCUSSION

Food fermentation is a simple, economical, and globally popular food processing method that enriches diets with protein, minerals, and nutrients, enhances flavours, removes anti-nutritional factors, and is deeply rooted in the culture and traditions of many indigenous communities.⁷⁹ As a part of Indian culture, Ayurveda also represents a variety of fermentative products by name of *Sandhana Kalpana*. It includes both alcoholic and acidic fermentative products. *Shukta Kalpana* represents acidic fermentative preparations.

Nighantus offer synonyms, methods of preparation and properties of *Shukta Kalpana*. *Harita Samhita* and *Madhava DravyaGuna* dedicate separate chapter to *Shukta Kalpana* named as the “*Kanjika Varga*”, and The Ayurvedic Pharmacopoeia of India (API) and Ayurvedic ForMulary of India (AFI) includes only definition of *Kanjika*. *Shukta Kalpana* includes various preparations, which are mentioned in table no. 1.

Shukta Kalpana refers to acidic fermentative products in

Ayurvedic classics where 'Shukta' word indicates sourness. Early references are found in *Charaka Samhita* where nine *Asava Yoni* are described including *Sauviraka*, *Tushodaka* and *DhanyAmla*, noting their properties.⁸⁰ In *Bruhadtrayee*, only properties of *Shukta Kalpana* have been mentioned. Later on commentators define it in their commentaries. It is elaboratively described by various *Nighantu* where they described synonyms, types, properties, actions, indications of *Shukta Kalpana*.

Shukta Kalpana is referenced across various *Varga*, *Adhyaya* and *Gana* categories, including *Annapanvidhi*, *Drava Dravya*, *Kanjika*, *AsavaArishta*, *Paribhsha*, *Madhyadi* and *Sandhana*. Within these contexts, terms such as *Shukta*, *Tushodaka*, *Sauviraka*, *Sandaki*, and *Kanji* are commonly discussed. Additionally, the concepts of *Asuta* and *Kalamla* are elaborated upon by later Acharyas. *Kanji* is most cited *Shukta Kalpana* by almost all Acharyas.

In Ayurvedic texts, the preparation of acidic fermented substances, commonly known as *Shukta*. It is prepared in two ways: 1. It is formed indirectly or when alcoholic preparations gradually become acidic over time. 2. Prepared by mixing of various ingredients in liquid media and kept for fermentation till get sour. Total 8 acidic preparations are found through classics which are *Shukta*, *Chukra*, *Shandaki*, *Tushodaka*, *Sauviraka*, *Kanji*, *Kalamla* and *Asuta*.

Dalhana Acharya notes that these preparations require six days of fermentation in *Ushna Kala* (hot season) and seven days in *Sheeta Kala* (cold season), underscoring the influence of seasonal factors on fermentation.⁸¹

Shukta which is prepared by fermentation of mixing different plant parts like roots, rhizomes, fruits with salt and oil in water. Traditionally, this method is used to make sour beverages in India where carrot, beetroot or radish is mixed in salted water with mustard seed and fermented till become sour. It is consumed as an accompaniment along with meals and it helps in digestion. It is called as *Kanji* in North India population.⁸² However *Kanji* described in Ayurveda literature mainly use rice for fermentation along with other ingredients. It may refer to sour rice gruel which is made from fermentation of boiled rice.⁸³ Types of *Shukta* uses different ingredients like Jaggery water, Sugarcane juice, Honey and grape juice. The sequence of *Guruta* unfolds through *Guda Shukta*, followed by *Ikshu Shukta*, *Madhu Shukta* and *Madhvika Shukta* respectively.⁸⁴ *Shukta* can be co-related with different types of vinegars. Sugarcane vinegar has a high content of sugar and is a potential substrate for making vinegar through alcoholic and acetous fermentation. Fermented vinegar has massive antioxidant potential.⁸⁵ Vinegar is produced from sugarcane juice in the Philippines and certain regions of India, such as Punjab and the southern states. However, there have been no reports of its production from liquid jaggery.⁸⁶ Grape vinegars are fermented grape derivatives with typical characteristics regarding their aroma and flavour. Grape vinegars are also considered as a functional food, i.e. providing biologically active ingredients with health benefits related to the prevention of chronic diseases.⁸⁷ Honey vinegar is made by acidic fermentation of mead which is an alcoholic

beverage made by fermenting a mixture of honey and water.⁸⁸ Fermented bee products present advantages like antimicrobial, anti-inflammatory, antioxidant, anti-tumor, and anti-allergic properties. Furthermore, the higher bioactivity enhances the taste and nutritional value.⁸⁹

Chukra is described as a product that is formed indirectly when alcoholic or sweet liquid preparations gradually become acidic over time, and it is further kept for fermentation till became sour. *Chukra* may consider as a type of *Shukta*. Also termed as synonyms for *Shukta*.⁹⁰ *Chukra* represents the slow traditional vinegar making process, where fruit juices ferment into alcohol and then oxidize into acetic acid. Traditional vinegars are made using slow methods, taking weeks or months to ferment. This long process creates a harmless, jelly-like substance called the mother of vinegar, made of acetic acid bacteria and cellulose.⁹¹

Tushodaka and *Sauviraka*, are specifically mentioned to be made from barley grains. The differences between *Tushodaka* and *Sauviraka* lie in the husk of the barley used, with *Tushodaka* employing barley grains with husk, while *Sauviraka* uses de-husked barley. These two can be co-relate with a sour fermentative product of barley like malt vinegar. Malt vinegar is a product which is made from fermented barley malt.⁹² Barley shows high content of protein, minerals and vitamins, but also it is rich in various bioactive components such as β -glucan, phenolics and flavonoids. Studies have proven that β -glucan could relieve the cardiovascular diseases by inhibiting cholesterol synthesis and reduces low density blood fat content. These functional chemicals in barley can play an important protective role against metabolic diseases.⁹³ Similarly seers said that *Sauviraka* is used in GI tract disorders like *Grahani* (disorders of lower G.I.T), *Gulma*, *Udavarta*, *Anaha*, while *Tushodaka* is quoted as *Hridya*. Fermentation of barley can improve its nutritional value, reduce anti-nutrients, and enhance the digestibility of nutrients.⁹⁴

Sandaki is preparation which is used mainly radish. Though direct relevance of this preparation cannot be found with any drink today but pickled radish is popular food recipe which is made by acidic fermentation of yellow radish with salt in Asia.⁹⁵ Evidence showed that pickled radish had a variety of health benefits and biological activities, including antibacterial, anti-atherosclerosis and lipid-lowering.⁹⁶ Previous studies have shown that antihypertensive factors such as polyphenols, arginine, and α -linolenic acid contained in salted radish can reduce heart rate and systolic blood pressure of spontaneously hypertensive rats by inhibiting sympathetic nerve activity and ACE activity.⁹⁷ In addition, another report showed that the consumption of radish leaves ethyl acetate extract may improve the hypertensive state of rats by increasing serum NO concentration, faecal Na⁺ concentration and antioxidant enzyme activity.⁹⁸

Kalamla is prepared with sesame paste. Traditionally, 'Sithu' is a fermented sesame seed product consumed by ethnic Kuki-Chin tribes of Manipur, India which may resembles with *Kalamla* described in Ayurveda literature. 'Sithu' is used routinely as side dishes or condiment in preparation of meat and

vegetables. Fermentation of sesame reduces anti-nutrients like phytate and oxalate that inhibits or reduces bio availabilities of minerals and other nutrients which are otherwise normally present in raw sesame seed.⁹⁹

Asuta is made by fermentation of roots like *Aaluk* (sweet potato), rhizomes like *Mulak* and fruits like *Vartak* (brinjal) in major quantity.¹⁰⁰ It is similar to *Shukta* preparations. But may difference in other materials like Jaggery water, sugarcane juice or honey and *Jambiri* juice which are used in *Shukta* preparation. It also seems that *Asuta* word is used for generally fermentation process. *Asuta* is described by very few Acharya. Due to use of similar ingredient, it may possible that other Acharyas not count it as separate preparation.

Kanji is foremost preparation among *Shukta Kalpana*. It is referred by all seers. *Kanji* is also presented as a substitute for all *Shukta Kalpana*.¹⁰¹ Various Acharya mentioned various methods of preparation for *Kanji* different ingredients like *Shali*, *Kulmasha* (Black Lentil), *BalaMulaka* (Radish), *Godhuma*, *Kodrava*, *Kshudra Dhanya*, *Yava* etc. The preparation of *Kanji* from *Masha Vataka* is particularly mentioned by *Bhavamishra* as it is more beneficial.¹⁰² providing flexibility in therapeutic formulations. Further elaboration in *Raja Nighantu* on *Tailayukta Kanji* (oil-based fermented beverage) suggests that its application, when used in *Mardana* (frictional massage), can lead to undesirable effects such as *Palitya* (premature graying), *Vatakaraka* (Vata aggravation), *Dahaka* (burning sensation), and *Gatrasaithilya* (muscle laxity).¹⁰³ When *Shali* used for *Kanji* preparation called as *Bhakta Kanji*, characterized by qualities such as *Madhura*, *Amla*, *Deepana*, *Dahashamaka*, *Laghu* and *Tarpana* (nourishing) is seen as a therapeutic remedy with specific benefits.¹⁰⁴ The diverse range of methods for preparing these fermented substances illustrates their deep connection to Ayurvedic concepts, reflecting not only their nutritional aspects but also their medicinal properties.

As discussed earlier, Traditional *Kanji* preparations used in India used different ingredients than *Kanji* in Ayurveda. Rice is the main source of this preparation. It is also mentioned that *Kanji* should be prepared from *Shastika Shali* (rice which is prepared in 60 days) which is also known as *Ashu Dhanya*.¹⁰⁵ Rice-based fermented products are widely found in the world, such as sour gruel, fermented rice vinegar, sour rice soup (rice-acid)¹⁰⁶ etc. Fermentation enhances the rice by enriching it with essential amino acids, vitamins, minerals, prebiotics, and probiotic organisms while breaking down antinutrients like phytic acid, tannins, and polyphenols, thereby increasing its nutritional value, energy content, and therapeutic potential.¹⁰⁷

Shukta Kalpana is used as both food as well as medicinal purposes. It helps in digestion, improves appetite and acts as pre/probiotics for gut health. Also, particular use in disease conditions like *Pandu*, *Krimihara* and *Raktapittakara*. External applications are also highlighted by seers. This emphasizes the holistic nature of Ayurvedic fermentation and its integration into the broader system of health and wellness practices.

CONCLUSION

Shukta Kalpana, a unique category of fermented preparations in Ayurveda, which include a range of acidic fermented products such as *Kanji*, *Tushodaka*, *Sauvira*, and others, have diverse therapeutic properties and plays an essential role in the holistic approach to healing in Ayurvedic medicine. The diversity in types of *Shukta* preparations and their varying impacts on health underscore their importance in Ayurvedic pharmacopoeia. While the therapeutic benefits of *Shukta Kalpana* are well-documented in ancient Ayurvedic texts, modern research and clinical studies can further help validate and expand upon these traditional practices. In conclusion, *Shukta Kalpana* exemplifies the profound and intricate understanding of fermentation processes in ancient Indian medicine, offering valuable insights for contemporary Ayurvedic practitioners and researchers.

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